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'Plus ca change ...' change and stasis in the age of Irish fertility, 1961-2002: a spatio-temporal analysis

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"Plus ça change....."
change and stasis in the age structure of Irish fertility, 1961-2002: a spatio-temporal analysis

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ABSTRACT

Since the 1960s Irish fertility has undergone dramatic change. While the broad outlines of both the nature and the origins of such change are, by now, well enough known and understood, little attention has been paid to the way in which changes in age specific fertility have been manifested regionally. This paper uses cluster analysis to group counties and county boroughs/cities according to their age-specific profiles of fertility at each full census year between 1961 and 2002 and then ANOVA to identify meaningful statistical relationships between cluster membership in each year and variables descriptive of the demographic and socio-economic context. By 1981 younger fertility profiles had spread from south eastern areas to almost all regions, but during the 1980s older fertility profiles became increasingly characteristic throughout western and northern districts. Despite the on-going, nation-wide ageing of fertility profiles since 1991, this basic regional distinction has remained largely intact. Prior to 1981 changing marriage patterns and family planning among older women seem to have underpinned profile change. Thereafter, however, profile change patterns seem to have socio-economic and perhaps cultural contextual origins.

***Key index words**: fertility, cluster analysis, family planning.*

Introduction:

The dramatic changes that have brought Ireland into the mainstream of Europe's second demographic transition (Coleman, 1992) have been well enough documented for there to be little argument over the broad outlines of the modernization of Irish marriage and family formation behaviour, or their underpinning socio-economic and cultural transformations (see, for example, Walsh, 1972; 1974; Keating, 1977; Sexton and Dillon, 1984; Coleman 1992; O'Grada and Walsh, 1995; McCarthy and Murphy-Lawless, 1997; Drew, 1999; Fahey *et al.*, 1999; Fahey, 2001). By the end of the 1980s, therefore, the Irish national Total Fertility Rate (TFR) had fallen from a mid-1960s peak of slightly more than four births per woman to below replacement levels, where it has since remained. This is still higher than in most European nations, but certainly comparable to them. As elsewhere among demographically advanced societies, this transition was underpinned by a substantial transformation of the role of marriage in relation to child bearing and rearing (Fahey *et al.*, 1999:189). This involved major reductions in the proportions of women married at all ages under 40; rising levels of cohabitation, age at first marriage and the proportions of all births occurring outside marriage; the delaying of reproduction within marriage and sharp declines in the numbers and proportions of higher order births. As a consequence, the peak of the Irish national fertility schedule has shifted from women aged 25-29 to those aged 30-34 (Figure 1) with, more recently, a sharp rise in fertility among older women.

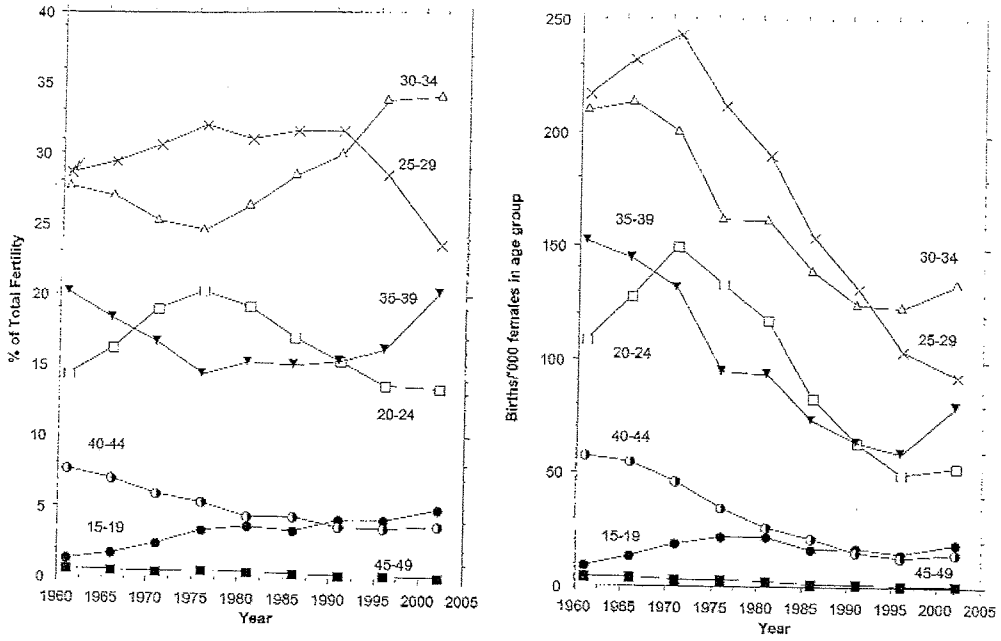


Figure 1: Age-specific fertility trends, Ireland, 1960-2003
(a) Age specific birth rates as % of Total Fertility; (b) Age-specific birth rates

Underpinning Ireland's participation in the second European demographic transition has been a set of "inward changes within Irish society itself" (Coleman, 1992:53) These include rising levels of female educational attainment and a consequential increase in their labour force participation (Fahey, 2001); the substantial restructuring of the Irish economy away from agriculture towards a modern urban, industrial and service based market economy; membership of the European Union; the reversal of the long-established pattern of substantial net out-migration; declining adherence to Church teachings regarding contraception (Murphy-Lawless, 1993; Coleman, 1992) and the now general availability of family planning. The quantitative importance of individual components of this intertwined skein of changes, however, remains undetermined.

If the nature and extent of change at the national level are now clear, the same cannot be said about the local and regional dimensions of change. Indeed, such matters seem to have attracted little attention since the seminal works of Coward (1978, 1982, 1986), Sexton and Dillon (1984) and Creton (1991a;b). In part this may simply reflect the substantial decline and convergence of county-level fertility to which Coward drew attention (Coward, 1982:111.) However, changing theoretical, methodological and topical emphases within population geography, in which fertility appears to have moved some distance from centre stage, may also have contributed to this shift (Boyle, 2003; Findlay and Graham, 1991).

One particular gap in understanding Ireland's recent fertility transition concerns the way in which the changing age-specific distribution of childbearing was experienced regionally. Yet it is from examining such changes against the locally varying background of relevant

opportunity sets, prohibitions, conventions, institutional arrangements and attitudes that the emergence and uptake of a complex of individual attitudinal and behavioural changes (affecting, for example, marriage, contraception, the timing and extent of childbearing) area most likely to be observed and understood.

This paper therefore has the following objectives:

1) to outline a method for analysing local/regional variability in the age-specific profile of reproductive activity;

2) to explore temporal and spatial changes in Irish age-specific reproductive profiles at the county and county borough(CB)/city level and, in particular, to identify whether there have been leading and laggard regions to the process of reproductive change, such as were frequently observable in the diffusion of the fertility transition itself (see for example, Carlsson, 1966; Noin, 1991); and

3) to ascertain whether changes to the age-specific profile of reproductive activity can be related to the timing and extent of other forms of social and demographic change, such as marriage patterns, local variability in the availability or uptake of modern family planning, or regional social and economic development.

While the questions themselves are quite straightforward, it seems at least possible, despite the now greatly reduced overall level of reproductive activity, that answers to such questions may suggest lines of enquiry useful to other researchers interested in examining individual and family behavioural level change in fertility within their specific regional contexts. To this end, in the first of five segments data sources and analytical methods are discussed. In the second, a typology of fertility profiles resulting from the application of cluster analysis to county level age-specific fertility between 1961 and 2002 is outlined and the temporal sequencing and spatial patterning of these profile types presented. In the third section of the paper, a general model relevant to an explanation of age-specific fertility change is specified. In part four the results of statistical analyses of relationships between profile change and a selection of potentially relevant determinants and contextual variables are presented. A concluding section summarises and discusses these results.

Data and methods

Data sources and preparation

Age-specific fertility rates (births/1,000 women of a specified age group) were computed for county/county riding, and county borough/city units (hereafter, "county units") for which annual birth numbers tabulated according to maternal age and place of usual residence (CSO, annual) and census counts of females according to age (CSO, various) were available. Birth numbers were averaged over three years, centred on full census years, but excluding the partial census of 1979. Prior to the computation of averages, births for which the age of mother was not stated were distributed across the age range in proportion to those of known maternal age. Average age-specific birth rates were then computed for each of the seven cohorts of reproductively aged females for each of the 255 county units[1] included in the study. These were then standardised by conversion to proportions of the total fertility, in order to overcome the very substantial variability in fertility levels over the period involved and to focus attention more firmly upon the shape rather than the "elevation" or magnitude of the age-specific rate profiles.

As the total number of women reproductively "at risk" fell even marginally below 5,000 only once (Leitrim, 1971) and the three-year birth total numbers below 1,200 on only three occasions, (Leitrim, 1991, 1996 and 2001) the robustness and stability of these proportions is considered to be generally quite high. Because of their usually substantially smaller birth numbers, their greater potential for instability and their usually very limited contributions to total fertility, however, proportions for the youngest (15-19 years) and oldest (45-49 years) cohorts were not used to distinguish between profile types.

Age-specific fertility analysis

Previous studies of age-specific fertility have employed a variety of methods. At the national level, mathematical models have been fitted to age-specific data and the resulting best-fit curves described by a small number of parameters. At their most elaborate, these may involve functions of some complexity (see, for example, Mitra, 1967; Murphy and Nagnur, 1972; Coale and Trussell, 1974; Page, 1977; Pittenger, 1980; Hoem *et al.*, 1981; Chandola *et al.*, 1999, 2002), but simpler approaches have employed only such parameters as the mean age at childbearing, the standard deviation and measures of kurtosis and skewness (see, for example, Hermalin, 1971). Anderson and Silver (1992) in attempting to measure the extent of "stopping behaviour", *i.e.*, fertility limitation at older ages, used only the proportion of the cumulative age distribution of fertility at ages ≥35 years to distinguish between early and later stopping populations. At the sub-national level analyses of variability in the age structure of reproduction more commonly have tended to eschew such summary measures in favour of the separate examination of one or more individual age–specific measures. For example, as dependent variables in regression analyses (Schultz, 1973) or, alternatively, they have sought to simplify the reproductive profile by extracting factors or principal components from the matrix of age-specific rates (Collver *et al.*, 1967; Wilson, 1991). Bell (1989), however, has applied cluster analysis to the array of age-specific fertility rates to create a typology of areas with similar fertility profiles.

Cluster analysis: Because of the quite "tight" distribution of Irish county-level mean age at motherhood values and measures of skewness and kurtosis, cluster analysis has been employed here to generate a typology of fertility profiles. Specifically, Ward's method for multivariate agglomerative hierarchical clustering (SAS Institute, 2002) was applied to the data matrix of two hundred and fifty five cases (county-units at each of the eight censuses) and five variables (the proportions of total fertility accruing to each of the cohorts of women aged between 20-24 and 40-44 years). In essence, this iterative, inductive procedure searches for empirical regularities among the two hundred and fifty five fertility profiles by successively combining individual cases, and subsequently, average profiles for groups of cases ('clusters'), with the next most similar individual or group average profile. This produces profiles which optimize the minimum within-cluster variance (the sum of the squares across all five age groups) over all partitions obtainable by merging two clusters from the previous generation, until, in the final stage, all cases are combined into a single group or cluster. (SAS Institute, 2002). As the term 'hierarchical' suggests, clusters at any stage of the process will be non-overlapping and "nested', i.e., subsumable into larger, more inclusive but less homogeneous clusters (Aldenderfer and Blashfield, 1985:36-7).

Because cluster analysis offers a multiplicity of outcomes and there is not necessarily any one best solution, determining the number of clusters to be selected requires subjective decision-making, the choice tending to be driven by pragmatic considerations rather than

strict statistical guidelines (Stimson *et al.*, 2001:28). In this study, the seven-cluster solution was preferred over eight-, nine-, and ten-cluster versions as the most effective and usable grouping of profiles, for the following reasons: 1) between-cluster dissimilarity diminishes rapidly beyond this point; 2) the number of years in which any profile type is represented by just a single county unit is minimised; 3) the seven-, eight-, and nine-cluster solutions were effectively identical in five of the eight census years; 4) in 1971, 1981 and 1986, the shift from seven to eight or nine clusters did little more than increase the degree of differentiation within the same group of a dozen or so counties without improving interpretability and 5) the seven-cluster solution was superior to the eight and similar to the nine-cluster solution in terms of the proportions of statistically significant pair-wise (*i.e.*, between-cluster) comparisons of cohort mean fertility proportions, suggesting the profiles generated have a reasonable degree of individual distinctiveness. Mean age-specific proportions of total fertility for each profile type are presented in Table 1, together with indicators of the statistical significance of between-cluster differences in these proportions.

Table 1: Mean age-specific proportions of total fertility, 7-cluster solution, Irish County Units, 1961-2002.

Age Group	Cluster Type*						
	T 1	T 2	T 3	T 4	T 5	T 6	T 7
*15-19 yrs**	*1.28*	*3.45*	*3.03*	*4.60*	*1.74*	*5.59*	*3.25*
20-24 yrs	13.68	19.64	14.59	12.12*	16.92#	16.90#	12.84*
25-29 yrs	27.54*	31.29#	31.86#	23.65	29.53	27.53*†	28.36†
30-34 yrs	28.33	25.85	30.27*	34.65#	26.55	30.76*	34.59#
35-39 yrs	20.48*	14.81	15.85#	20.93*	18.18	15.78#	17.06
40-44 yrs	8.03	4.61	4.16*	3.91*#	6.61	3.24†	3.69#†
45-49 yrs	*0.66*	*0.34*	*0.25*	*0.14*	*0.48*	*0.19*	*0.21*
N of cases	32	86	31	16	45	21	24

* Clustering was based on only those cohorts between 20-24 and 40-44 years of age.

*, #, and † denote age-specific between-cluster pairs of means that are NOT significantly different at the $p \leq 0.05$ level

Profile type associations

Because the original two hundred and fifty five fertility profiles have been condensed into seven profile 'types' with only nominal or categoric status, relationships between profile type membership and underlying socio-economic and demographic variables in any census year have been based upon comparisons of the mean values of such variables for county units in each profile type, using analysis of variance (ANOVA). Because the basic assumptions underlying this test - particularly those relating to the equality of case numbers across profile types and to distributional normality - are not always well met, significance levels for pair-wise comparisons may not be entirely reliable. When profile types were represented by just one or two cases in any year therefore, they were either combined with the most similar larger group or excluded from the statistical analysis, though not necessarily from the subsequent subjective interpretation of mean differences. Kruskal-Wallis non-parametric one-way analyses of variance were not generally possible because of the requirement that there be at least three categories of profiles (Siegel, 1956), and because no measures of the significance of pair-wise comparisons could be generated.

Fertility profiles – forms, transforms and regional change

Forms and transforms

As Table 1 and Figure 2 demonstrate, profile types vary with respect to the age at which peak proportions occur; whether peak fertility proportions involve one or more dominant age groups; the dominance of the peak proportion; and the importance of 'buttressing' age groups. In essence, profile types take two major forms: those with a fertility peak in the late 20s (T2, T3 and T5; 63.5% of all cases) and those with peak fertility among women in their early 30s (T1, T6, T7 and T4; 36.5% of cases). Within each of these categories the component profiles exhibit a gradational sequence in the degree of dominance of their peak fertility cohorts, together with some quite readily apparent differences in the importance of buttressing cohorts.

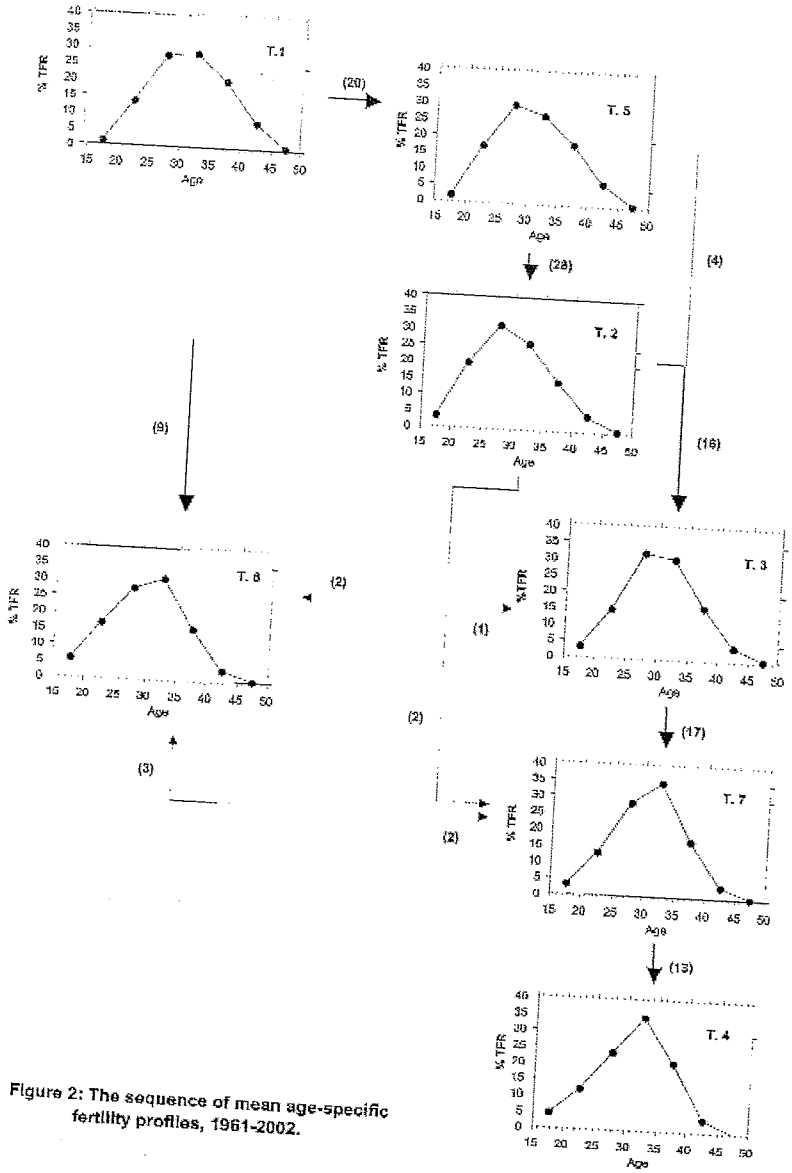


Figure 2: The sequence of mean age-specific fertility profiles, 1961-2002.

Table 2: Between-profile type transitions, Irish county units, 1961-2002.

Origin Cluster	Destination Cluster							Total Shifts from cluster	Shifts to main destination cluster	% all shifts to main destination cluster
	1	2	3	4	5	6	7			
1					*20*			20	20	**100.00**
2			*16*		1	9	*2*	28	16	**57.14**
3				1		2	*17*	20	17	**85.00**
4								0	0	
5		*28*	5					33	28	**84.85**
6			1				2	3	2	**66.67**
7				*13*		3		16	13	**81.25**
Total		**28**	**22**	**14**	**21**	**14**	**21**	**120** [(a)]	**96**	**80.00**

[(a)] From the total of 255 cases there is the potential for 222 between census year transformational shifts after allowing for such changes as the combination of Dun Laoghaire with Dublin County and the excision of Galway CB from Galway County. That only 120 transformations are noted here reflects the fact that not every county unit changed its profile category in every intercensal period. Limerick County Borough and Carlow, for example, retained Type 2 profiles from 1966 to 1991 and 1971 to 1991 respectively.

As might be expected from the national experience, a clearly-defined transformational pathway of profile types is apparent, with high proportions of county units of any profile type sharing a common next stage in the transformational process. As Table 2 and Figure 2 show, for example, twenty eight of the thirty three county units ever developing T5 profiles next evolved into T2 profiles. In their next transitional stage, sixteen of the twenty eight then developed T3 profiles, nine Type 6 and two Type 7, with one "reverting" to T5. In short, once a county unit developed a particular profile there was a strong probability that subsequent transformational states would follow this evolutionary sequence, regardless of when change occurred. The few reversionary shifts – e.g. between T2 and T5 (Tipperary North between 1981-86) or between T7 and T6 (Cavan, Longford and Tipperary North; 1996-2002) are clearly both exceptional and short lived.

While clear similarities exist between time-specific national profiles and the defined profile types, the temporal bounds of these transitional states are much less temporally constrained, for county unit profiles evolve on their own time-scales. In Kildare, Waterford, Wicklow, Limerick CB and Tipperary South, for example, only three of the seven profiles ever evolved, with T2 profiles holding sway for twenty five years. By contrast, Tipperary North, Kilkenny or Meath, *inter alia*, metamorphosed through six types in the same period. It is therefore clear that some county units have been leaders in the process of change and others, just as clearly, laggards. Tipperary North, Monaghan and other central and western areas, for instance, first registered Type 2 profiles fifteen years after they initially appeared elsewhere. As Figure 3 demonstrates, however, there is a strongly marked tendency for profile types to cluster in both space and time. To facilitate subsequent analysis and discussion, three broad periods of regional profile change have been identified, viz. 1961-1981, 1981-1991 and 1991-2002.

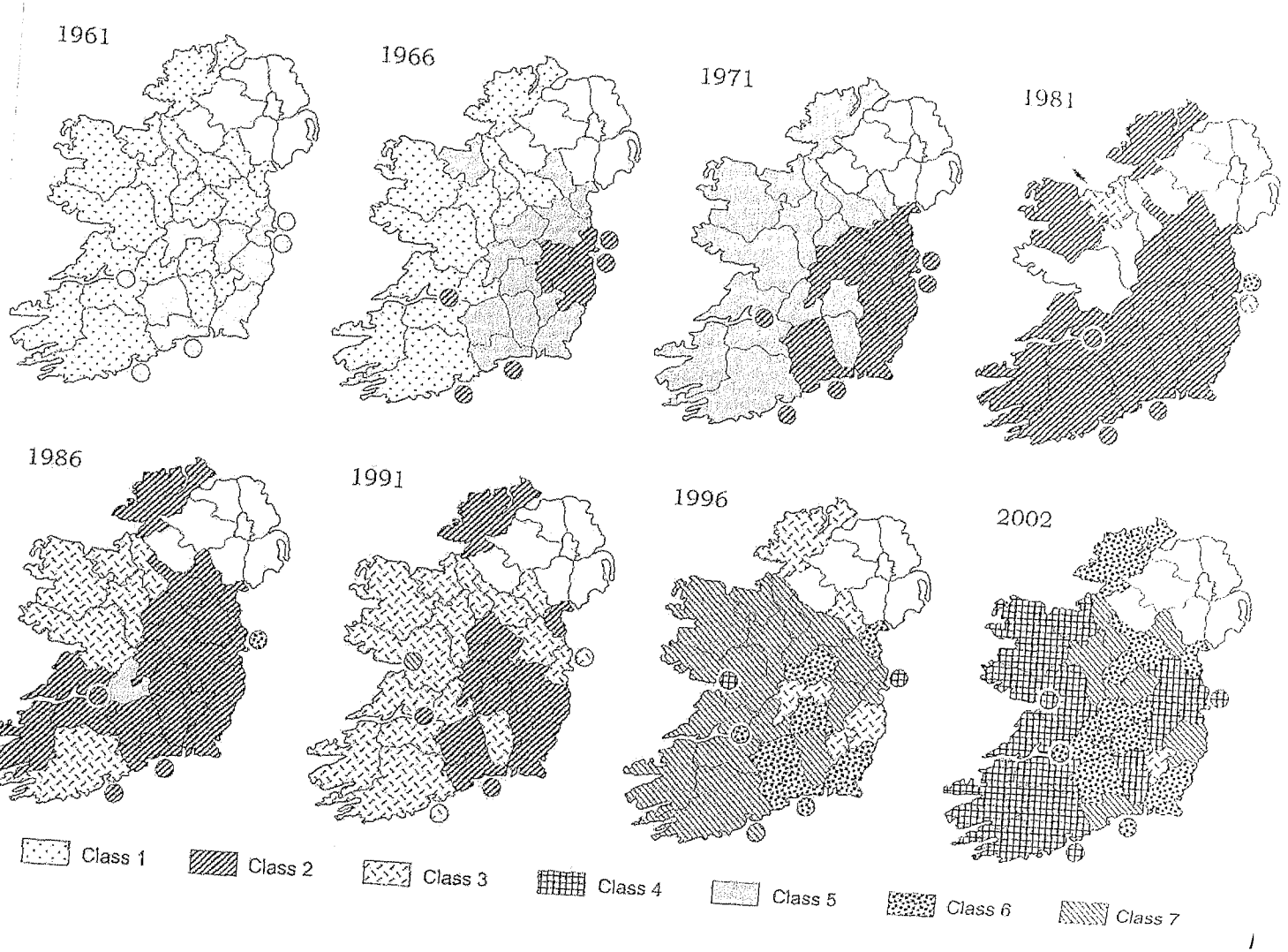


Figure 3: Fertility profile patterning, 1961-2002.

Regional change

1961-1981: Initially, T1 profiles, with highest fertility proportions at age 30-34 years and quite similar proportions at 25-29 years, dominated everywhere except in the southeastern counties and county boroughs where T5 profiles, with a single peak at age 25-29 years, held sway. Over the next two decades, however, a diffusion-like process seems to have occurred, with first T5 and then T2 profiles – each with an increasingly strongly marked 25-29 years peak and diminishing proportions at older ages - sequentially invading and replacing from that source region. By 1971, T1 profiles had been entirely displaced and by 1981, only Galway, Roscommon, and Leitrim were resisting the second transformational wave (T2). In Dublin CB, Dun Laoghaire Borough and Sligo, however, older profile types (T3; T6) had already begun to reappear.

1981-1991: By 1986, T3 profiles, with peak fertility among 25-29 year olds, rising levels among 30-34 year olds, but significantly lower proportions at age 20-24 years than T2, had spread from Sligo to neighbouring Leitrim, Galway and Mayo and, by 1991, into not just the western half of Ireland but also through a tier of northern and eastern counties from Cavan to Dublin, and also Kilkenny. By the end of the 1980s, therefore, the earlier regional cleavage between a younger profiled southeast and the remainder of the nation had been re-established.

1991-2002: During the 1990s this distinction persisted. In the west, and increasingly in the Dublin overspill zone (Dublin County; Meath; Kildare), fertility proportions attributable to women in their thirties continued to rise. For example, in this region, by 2002, eleven of the sixteen county units with T3 profiles in 1991 had evolved T4 profiles in which the proportions of total fertility attributable to those older cohorts reached their highest ever levels (35% and 21% of total fertility respectively). In the southeast, however, in most cases the dominant T2 profiles aged but failed to reach T7 status, remaining consistently, though not uniformly, younger than elsewhere, thereby preserving the initial distinction between the traditional heartland of earlier marriage and childbearing in the southeast and the older north and west. Only in Kilkenny was the sequence of transformational states through to T7 profiles fully achieved, perhaps reflecting its growing function as an overspill for both Waterford City and the Dublin region (Ó Broin, 2002).

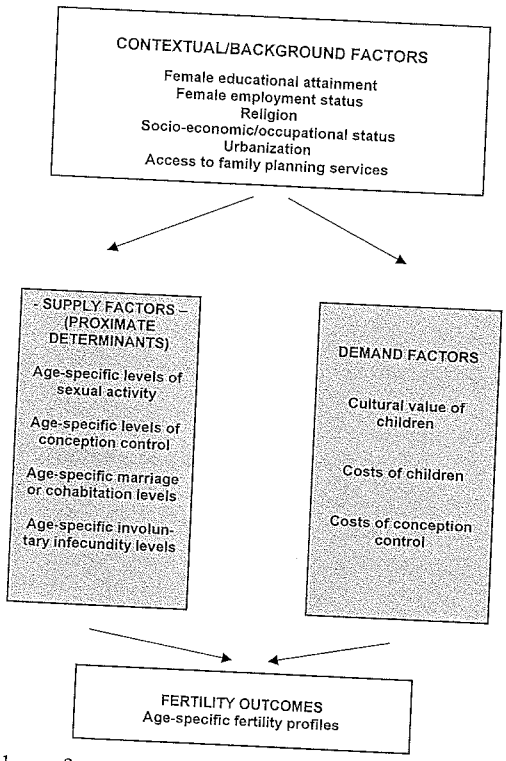
The bases of profile form – a conceptual framework

Aggregate fertility differentials can only result from variations in the operation of the "proximate determinants" of fertility, that is, in the proportion of females married or in other forms of sexual union; the extent of deliberate conception control exercised; and/or the incidence of involuntary infecundity (Bongaarts, 1978). Variations in the form of the age-specific fertility profile may therefore be conceptualised as reflecting cohort-specific differentials in such determinants. But the significance of any individual determinant is itself likely to vary according to socio-economic and cultural context, reflecting spatial and/or temporal variations in factors affecting, for example, the cost-benefit or supply-demand frameworks within which family-formation and childbearing decision-making take place.

Following Fahey (2001), this interpretation of spatio-temporal variation in Irish fertility profiles is located within a simple but oft-employed conceptual framework which assumes that the form of the fertility profile results from the age-specific impact of factors affecting (a) the "demand" for children - basically those factors affecting the cost of children, but also including the cultural value placed upon children in the larger society - and the costs, both

monetary and non-monetary, of conception control; and (b) the "supply" of children - i.e. "those factors causing couples to have more or fewer children than they might want to have" (Fahey, 2001:168). These are efectively Bongaarts' "proximate determinants", which, may also be conditioned by contextual or background factors impacting upon fertility-relevant belief systems, attitudes, knowledge and behaviour, such as the opportunities for and the timing of marriage, access to effective contraception, or the acceptability of non-marital conception.

Figure 4: A conceptual framework for the analysis of age-specific fertility profiles (after Fahey, 2001).



While not all of these factors can be quantitatively expressed, or even approximated, enough is known concerning the direction of contextual effects upon both the costs of children and the proximate determinants to facilitate such an analysis (see, for example, Andorka, 1982; Ni Bhrolchain, 1993). For example, age at first marriage and/or first birth is likely to be lowest among social groups for whom the array of attractive and achievable alternatives to and thus, the opportunity costs of childbearing are least, and highest among those with most to lose from early marriage and/or childbearing. For better educated women capable of engaging in well-paid employment, therefore, the costs of childbearing are likely to be higher, and their adoption of modern family planning methods therefore both earlier and more effective, than among those less well educated, engaged in lower paid or on-farm employment or even the unemployed, for whom, perhaps, the effective use of modern family planning methods may also be both monetarily and socially/culturally less acceptable. In similar vein, it can be argued that maternal employment off-farm, or at least out of the home, also increases the cost of a child. However, the strength of Catholic pro-natalism/familism,

by enhancing the cultural value of children, may both increase the demand for children in any union and also affect supply-side factors such as attitudes towards sexual activity outside marriage, age at marriage and the use of contraception or even abortion.

To test these associations, in each census year between 1961 and 2002 census-based county unit level data sets were prepared for an array of socio-economic and cultural variables conventionally regarded as associated with or underpinning fertility differentials (see Figure 4, upper panel) , viz.

> *Urbanization:* Proportions of the population resident in centres with at least 1,500 residents;
>
> *Labour force participation*: Labour force participation and unemployment rates among females aged ≥15, 20-24, and 25-34 years;
>
> *Socio-economic status/social class:* Proportions of males 15 years and above and females aged 15+, 20-24, and 25-34 years (a) in the labour force, (b) employed in agriculture, white collar, or technical and professional occupations, (c) in socio-economic groups such as Higher and Lower Professionals and the unskilled; and (d) in the still broader, overarching categories of Social Classes 1and 2 (a combination of persons employed in the professions, in managerial and technical occupations, proprietors and larger farmers) and Social Classes 5 and 6 (containing persons employed in semi-skilled and unskilled occupations e.g. bookmakers, assemblers and line workers farm workers, refuse collectors, general labourers); and (c) proportions of males, females, or persons in the labour force unemployed.

While there are obvious overlaps between some of these levels of aggregation, in general, the shift from specific occupational types to social classes involves an increasing emphasis upon the status of the occupational skills required. Whereas occupational types are undifferentiated according to skill, and therefore include both proprietors, managers and labourers employed in a specific sector, socio-economic categories are defined with regard to the occupational skills and educational attainment levels required in the performance of an occupation, while social class distinction integrates across occupations on the basis of the skill levels required, without regard for educational attainments. All three levels of aggregation have been employed here to test relevance of this distinction.

> *Educational attainment*: Proportions of females aged 15+, 20-24 or 25-34 years with (a) only primary or primary and lower secondary schooling; (b) completing formal education at ≤16 years of age;
>
> *Cultural traits*: Proportions of females aged 20-24 and 25-34 years speaking Irish (potentially indicative of stronger adherence to Irish traditional familistic values, particularly in earlier decades); proportions of females aged 20-24 and 25-34 years Roman Catholic.

Other variables indicative of demographic change such as intercensal rates of population change, net migration, infant mortality (total and age-specific) and age-specific, ex-nuptial birth proportions were also computed, but appear to have played no significant direct role. This is not to imply that variables such as the level of net migration level play no part at all in the explication of fertility profile type patterning and change but rather, to suggest that their impact, if any, is more likely to be indirect in nature and transmitted through such proximate determinants as cohort marriage proportions or such contextual variables as cohort labour

force participation rates (through the selective stripping or supplementation of a cohort's unmarried, the job seekers, the qualified, etc.). For this reason no attempt to further elucidate their role has been attempted.

Because comprehensive time series sets of county unit data were not available for variables indicative of contraception use, sexual activity levels, or even duration of marriage, specific testing of the impact of the proximate determinants has been limited mainly to marriage proportions. The role of contextual variables in any year is inferred from the pattern of differences between fertility profile type means on each of these variables.

The underpinnings of change in space and time

Phase 1: the age of "diffusion", 1961-81

As previously observed, the defining characteristic of the changing distribution of fertility profile types was the replacement of the initially dominant T1 profile, first by T5 and then T2. In each of these transformations increasing proportions of total fertility accrued to women in their twenties at the expense of older cohorts. Given the apparently very limited roles of ex-nuptial fertility and artificial birth control in Ireland at this time (Wilson-Davis, 1974) such clear distinctions in the scheduling of childbearing would seem most likely to have resulted from differentials in marriage proportions, especially at younger ages - not least because pre-marital conception may often have precipitated such marriages.

Marriage proportions and duration: As Table 3 indicates, in 1961, 1966 and again in 1971, between the ages of 20-29 years, between-profile differences in mean fertility proportions do vary in accordance with female marriage proportions. At older ages, however, the reverse is true. By 1981, with one profile type (T2) comprehensively dominating, this tendency was somewhat obscured, but could still be observed when T2 counties were compared with a residual category combining T3 (Dun Laoghaire; Sligo), T5 (Galway, Leitrim) and T6 (Dublin County Borough) profiles. During this period, therefore, basic profile form would seem to reflect differences in the extent to which younger women were marrying. As marriage was still very much the conventional precursor to childbearing, if not necessarily to pregnancy, though, this is hardly surprising.

At older ages the reversal of this relationship suggests the involvement of other factors. Two possible explanations for this suggest themselves, between-profile type differences in (a) the duration of marriage (since higher proportions of the more recently wed will tend to increase the proportions of those most at risk of childbearing); and/or (b) in the extent and timing of "stopping behaviour". As mean fertility proportions attributable to women aged 30-34 and 35-39 years in 1971 and 30-34 years in 1981 are positively associated with estimates of the proportions of all women in those cohorts wed for less than three years[2] this suggests that marriage duration may play a part. In view of the relative smallness of the differential, however, the possible impact of the unmeasurable second factor, contraception, also needs consideration.

Contraception: Artificial birth control methods may not have been readily available in the early 1960s (O'Reilly, 1986; Solomons, 1992; Prendiville and Short, 1993; IFPA, 2005). By the end of that decade, however, Family Planning Clinics had been established in Dublin and, by the mid-1970s, also in Cork, Galway and Limerick. However, even then there was still only "fairly ready access to contraceptives in Dublin, good to poor access in other cities, and virtually no access to contraceptives in rural Ireland" (O'Reilly, 1986:228). Surveys from

that period report, for example, that only twenty per cent of female respondents used condoms or the oral contraceptive, the great bulk being reliant upon the "safe period" (61.8%), withdrawal (13%) and abstinence (3%). But even among "planners" - most commonly urban dwelling, from the professional or white collar groups and more concentrated in younger cohorts (25-34 years) - conception planning tended to begin only after a pregnancy. For nearly 60 per cent of couples this occurred only after the birth of a second child, in fact, with only 12.5% doing so before the birth of a first child or upon marriage. Even in Dublin, only fifty four per cent of females surveyed attempted to limit or space births, with seventy five per cent of these using "natural" methods (Wilson-Davis, 1974:271-73).

Table 3: Proximate determinant associations with fertility profile types, 1961-2002.

Proximate Determinants	F†	R^2 (%)	Cluster Means							Cluster pairs significantly different ^
			T 1	T 2	T 3	T 4	T 5	T 6	T 7	
1961										
N =			(20)				(12)			
% females 20-24 wed	**21.84**	42.13	20.49				25.53			1-5
% females 25-29 wed	**30.63**	50.55	51.69				58.92			1-5
% females 30-34 wed	4.45	12.93	69.59				71.81			1-5
1966										
N =			(12)	(8)			(12)			
% females 20-24 wed	**20.37**	58.42	22.00	28.76			28.19			1-2; 1-5
% females 25-29 wed	**17.12**	54.14	57.39	66.29			63.72			1-2; 1-5
% females 30-34 wed	3.23	18.22	74.27	77.20			75.82			1-2
1971										
N =				(16)			(16)			
% females 20-24 wed	**32.56**	52.05		36.43			28.27			2-5
% females 25-29 wed	*11.01*	26.85		72.38			66.40			2-5
% females 30-34 wed	4.82	13.83		81.61			79.02			2-5
% wed females 25-29 wed < 3 yrs	**36.74**	55.05		24.63			29.00			2-5
% wed females 30-34 wed < 3 yrs	**45.25**	60.13		6.01			8.94			2-5
% wed females 35-39 wed < 3 yrs	**25.04**	45.49		3.45			4.88			2-5
1981										
N =				(26)	(2)		(3)	(1)		
% females 20-24 wed	17.05	41.10		38.04	(25.25)		27.50	(20.00)		2-5
% females 25-29 wed	5.05	15.75		75.46	(60.55)		69.83	(48.00)		2-5
% females 30-34 wed	1.28¢	4.30		87.15	(80.15)		85.43	(69.10)		
% wed females 25-29 yrs married <3 yrs	13.46	33.26		19.80	(22.06)		24.96	(20.89)		2-5
% wed females 30-34 yrs married <3 yrs	8.49	23.92		5.90	(6.65)		7.82	(5.77)		2-5
1986:										
N =				(23)	(6)		(1)	(1)		
% females 20-24 wed	10.56	28.11		27.19	21.82		(24.60)	(11.60)		2-3
% females 25-29 wed	3.05¢,	10.16		68.21	64.30		(66.50)	(39.70)		
% females 30-34 wed	0.07¢	0.26		83.07	82.60		(83.70)	(58.50)		
1991:										
N =				(14)	(17)				(1)	
% females 20-24 wed	7.79	21.17		18.34	14.95				(6.70)	2-3
% females 25-29 wed	2.61¢	8.26		60.85	57.24				(41.24)	
% females 30-34 wed	0.13¢,	0.45		79.49	78.69				(62.87)	
1996:										
N =					(5)	(2)		(8)	(17)	
% females 20-24 wed	2.18¢,	13.87			9.95	(2.78)		8.79	7.87	
% females 25-29 wed	1.21¢	16.50			48.63	(23.23)		44.63	44.72	
% females 30-34 wed	0.85¢	5.90			73.94	(50.20)		70.91	72.64	
2002:										
N =					(1)	(14)		(11)	(6)	
% females 20-24 wed	4.28	23.41			(4.56)	3.75		5.33	4.97	4-6
% females 25-29 wed	3.40	19.56			(30.88)	25.86		31.83	32.69	4-6; 4-7
% females 30-34 wed	1.71¢	10.89			(59.30)	58.17		60.18	63.71	-

† F-value significance levels: bold, $p < 0.0001$: italic, $0.0001 < p < 0.001$; normal, $0.001 < p < 0.01$; underlined, $0.01 < p < 0.05$; ¢, $p > 0.05$.
Means in parentheses indicate profile types not included in ANOVAs; N = no of county units in each profile type.

On this basis at least a *prima facie* case can be made that the diffusion-like spread of increasingly youthful fertility profiles throughout the 1960s and '70s, initially in the Dublin region and other large urban centres but later still further afield, was a direct outcome of the combination of increasingly widespread earlier marriage in combination with the growing use of increasingly efficient methods of birth control after the birth of one or two children.

Contextual variables: Throughout this period profiles were also consistently differentiated on an urban-rural dimension - as measured by proportions of the population in urban areas, white collar/professional and/or labouring and unskilled occupations and male employment in agriculture (Table 4) - but variables suggesting the importance of cultural (Irish speaking females) and social differentiation (female educational attainment) also differentiated between profile types. Prior to 1981, pair-wise comparisons of profile means on these variables seem to be statistically significant, with the mean values on urbanisation related measures sequentially incrementing from T1 to T5 to T2 and those relating to male employment in agriculture, limited female educational attainment and Irish language use levels diminishing in the same order. Even in 1981, when tests of the significance of differences between-profile means serve little purpose, a similar picture tends to emerge.

During this phase, then, older fertility and marriage profiles characteristically occurred in more heavily agricultural and Irish speaking localities, while younger regimes obtained in county units that were, on average, more highly urbanised, better educated and with greater concentrations of their labour force in higher status occupations. Until the early 1970s, profile changes seem to suggest a gradual erosion of the cultural divide between the traditional, restrictive, later marriage culture of rural, especially western, Ireland (Kennedy, 1973; Strassman and Clarke, 1998) and the wider opportunity set available to urbanised young women that made it possible for them to marry, or mate, at earlier ages and for older women, with readier access to modern contraception, to limit their childbearing after achieving the desired family size.

Phase 2: the resurgence of older age fertility, 1981 – 1991

By the beginning of the 1990s the availability and uptake of the oral contraceptive and condom were increasing rapidly. Family Planning Clinics had been established in most major cities, though women in rural areas were often still less well served (Prendiville and Short, 1993:247). Female labour force participation had increased greatly, especially at peak reproductive ages (25-34 years), where the rate almost doubled over the decade (36 per cent to 62 per cent), in contrast to the much smaller shift (71 per cent to 76 per cent) among younger women. Also, the decline in marriage proportions apparent among younger women by the mid-1970s was now evident at all ages. Age-specific birth rates therefore fell dramatically, the steep rise in ex-nuptial birth numbers and proportions notwithstanding, with a 3.8 per cent reduction in the share of total fertility accruing to 20-24 year olds fully offset by the increase among women aged 30-34 years. As a result the national fertility profile aged substantially.

The essence of the regional dynamic during this period is the widespread replacement of T2 by T3 profiles (T2->3).To elucidate the underpinnings of this shift, changes in mean fertility levels marriage proportions and marriage duration in county units experiencing this transformation (T2->3; n=12) are compared with those which (a) retained T2 profiles (T2->2; n=14) and (b) a residual category of county units which either retained T3 profiles throughout the decade or evolved into T3 from either T5 or T6 (Tn->3; n=5) during that time. As Galway CB did not exist as a separate statistical entity in 1985 it is not separately considered at this time.

Table 4: Contextual variable associations with fertility profile types, 1961-2002.

Selected Contextual Variables	F*	R^2 (%)	Profile Type							Significantly different pairs of profile types
			T 1	T 2	T 3	T 4	T 5	T 6	T 7	
1961 N=			(20)				(12)			
% males occupied in agric.	**28.71**	48.90	59.66				26.23			1-5
% population urban	**23.60**	44.03	20.39				62.83			1-5
% females 20-24 yrs Irish speaking	**22.46**	42.81	46.06				34.22			1-5
% females employed in white collar occupations	**20.13**	40.16	43.34				54.71			1-5
1966 N=			(12)	(8)			(12)			
% males occupied in agric.	**57.86**	79.96	53.55	5.64			35.71			1-2; 1-5; 2-5
% population urban	**33.52**	69.80	15.58	80.45			29.53			1-2; 1-5; 2-5
% females 14+ with only primary school education.	**15.66**	51.92	69.64	53.53			63.82			1-2; 1-5; 2-5
% males professionals	**13.72**	48.62	3.34	7.52			4.05			1-2; 2-5
1971 N=				(16)			(16)			
% males occupied in agric	**34.46**	53.51		23.32			51.82			2-5
% females 20-24 yrs Irish speaking	**25.28**	45.73		34.28			44.55			2-5
% population urban	***21.36***	41.59		59.24			19.73			2-5
% females 14+ with only primary school education.	***14.75***	32.96		58.74			67.31			2-5
% employed males labouring or unskilled	***15.25***	33.69		11.58			9.02			2-5
1981 N=				(26)	(2)		(3)	(1)		
% females 25-34 yrs in labour force	*13.80*	33.89		32.43	(46.57)		38.77	(52.66)		2-3
% females 20-24yrs in labour force	7.42	21.55		68.06	(71.22)		74.00	(78.39)		2-5
% males occupied in agric.	5.07	15.72		25.35	(17.17)		42.10	(0.78)		2-5
% females 20-24 yrs Irish speaking	11.67	30.18		41.27	(42.10)		52.40	(39.60)		2-5
1986 N=				(23)	(6)		(1)	(1)		
% females 20-24 yrs Irish speaking	14.51	34.95		35.51	44.20		(45.10)	(31.50)		2-3
% females 25-29 yrs only primary school education.	16.91	34.88		37.59	27.37		(29.76)	(41.28)		2-3
% wed females 25-29 yrs employed	12.25	31.21		38.11	45.47		(40.30)	(41.30)		2-3
1991 N=				(14)	(17)				(1)	
% females 15+ yrs primary or lower sec. educ'n	5.90	16.91		56.40	52.85				(37.61)	2-3
% labour force in unskilled occupations	15.38	34.66		12.11	9.85				(6.50)	2-3
% females 25-34 yrs in labour force	10.31	26.19		56.80	61.53				(71.23)	2-3
% females 20-24 yrs Irish speaking	11.32	28.08		39.83	46.01				(53.59)	2-3
1996 N=					(5)	(2)		(8)	(17)	
% females 25-29 yrs primary / lower sec. educ'n	**22.83**	62.83			32.92	(18.70)		31.25	23.25	3-7; 6-7
% females 25-34 yrs employed	12.34	47.76			58.11	(68.51)		60.74	64.19	3-7; 6-7
% males in labour force unskilled	9.60	41.55			11.31	(7.59)		11.48	9.51	3-7; 6-7
2002 N=					(1)	(14)		(11)	(6)	
% persons in labour force Lower Professionals	**22.84**	62.00			(10.34)	12.52		10.41	11.39	4-6; 4-7; 6-7
% females 15+yrs primary or lower secondary educ'n	12.91	47.98			(45.65)	38.88		46.93	43.97	4-6; 4-7
% persons in labour force Social Classes 1 and 2	12.17	47.22			(28.68)	34.09		28.17	31.12	4-6
% females 20-24 yrs unemployed	*9.85*	46.5			(7.27)	4.73		6.80	6.14	4-6; 4-7

F-value significance levels: bold, $p < 0.0001$: italic, $0.0001 < p < 0.001$; normal, $0.001 < p < 0.01$; underlined, $0.01 < p < 0.05$; ¢, $p > 0.05$.

Means in parentheses indicate profile types not included in ANOVAs N = no of county units in each profile type.

Changes in proximate determinants: In the light of previous findings a fertility decline among the youngest cohort (20-24 years) sufficient to generate profile reclassification from T2 to T3 might result from declining mean marriage proportions. Conversely, increasing older age fertility proportions might be expected to flow from increased cohort proportions of married and/or recently married women. Because the proportion of all births occurring outside of marriage rose significantly during this period, it is first necessary to ascertain whether or not between profile type differences in extra-marital fertility may have weakened the role of marriage. As Table 5 (panel 3) shows, however, the proportion of all births occurring out of wedlock in each of the key child-bearing cohorts, although greatly increased over the decade, was effectively the same for all three profile categories leading to the conclusion that regional cohort fertility relativities were not influenced by this phenomenon.

Table 5: Mean age-specific fertility, ex-nuptial fertility and marriage proportions, 1981 and 1991; percentage change, 1981-91; proportions of cohorts wed <3 yrs, 1981; by fertility profile change category.

Mean profile type age-specific fertility proportions

Cohort	20-24 yrs			25-29 yrs			30-34 yrs		
Change type	T2->2 (a)	T2->3 (b)	Tn->3 (c)	T2->2 (a)	T2->3 (b)	Tn->3 (c)	T2->2 (a)	T2->3 (b)	Tn->3 (c)
1981 %	21.58*	19.29*	16.78*	30.46*	31.47	30.60*	24.43*	26.01*	27.79*
1991 %	18.50*	14.78*	12.15*	32.49	32.53	31.64	26.91*	29.96*	31.66*
Abs. Diff ('91-'81)	-3.08*	-4.51*	-4.63	2.03	1.06	1.04	2.48*	3.90*	3.87
Abs Diff as % 1981	-14.13*	-23.04*	-27.48	6.74	3.43	3.70	10.30*	15.27*	13.94

Mean profile type age-specific marriage proportions

Cohort	20-24 yrs			25-29 yrs			30-34 yrs		
Change type	T2->2 (a)	T2->3 (b)	Tn->3 (c)	T2->2 (a)	T2->3 (b)	Tn->3 (c)	T2->2 (a)	T2->3 (b)	Tn->3 (c)
1981 %	40.51*	35.14*	26.16*	76.42*	74.33#	65.12*#	87.40*	86.85#	82.00*#
1991 %	18.34*	15.68	13.22*	60.85*	58.75	53.61*	79.49	80.1	75.17
Abs. Diff ('91-'81)	-22.17*	-19.47*	-12.95*	-15.58*	-15.59#	-11.51*#	-7.96	-6.70	-6.83
Abs Diff as % 1981	-54.87	-55.25	-50.13	-20.41	-20.95	-18.41	-9.07	-7.73	-8.81

Mean profile type age-specific ex-nuptial birth proportions

Cohort	20-24 yrs			25-29 yrs			30-34 yrs		
Change type	T2->2 (a)	T2->3 (b)	Tn->3 (c)	T2->2 (a)	T2->3 (b)	Tn->3 (c)	T2->2 (a)	T2->3 (b)	Tn->3 (c)
1981 % all births	7.29	8.00	8.40	1.52	1.23*	2.47*	1.19*	0.50*	1.32
1991 % all births	39.08	35.43	39.61	7.47	5.89	7.05	4.29	3.20	4.32
Abs. Diff ('91-'81)	31.79	27.43	31.21	5.95	4.67	4.58	3.21	2.70	3.00
Abs. Diff as % 1981	475.25	397.79	491.75	451.15	543.61*	96.43*	377.90	571.52	262.35

Proportion of cohort wed <3 years, 1981

Cohort	25-29 yrs			30-34 yrs			35-39 yrs		
Change type	T2->2 (a)	T2->3 (b)	Tn->3 (c)	T2->2 (a)	T2->3 (b)	Tn->3 (c)	T2->2 (a)	T2->3 (b)	Tn->3 (c)
% married females wed < 3 yrs.	18.86*	20.90*	23.76*	5.52*	6.34	7.38*	1.72	1.85	1.99

* and # indicate significantly different pairs of values ($p \leq 0.05$)

(a) The county units of Carlow, Donegal, Kildare, Laois, Limerick CB, Longford, Louth, Offaly, Tipperary South, Waterford CB, Waterford, Westmeath, Wexford, Wicklow.
(b) The county units of Cavan, Clare, Cork CB, Dublin, Kerry, Kilkenny, Limerick, Mayo, Meath, Monaghan, Tipperary North.
(c) The county units of Dublin CB, Galway, Leitrim, Roscommon, Sligo.

Changes in mean fertility proportions (panel 1) were much as expected, decreasing more at age 20-24 but increasing more at age 30-34 among county units with T2->3 profiles (see footnote to Table 5 for county units in each type) than among the T2->2 category; but mean marriage proportions did not change commensurately (panel 2). Among 20-24 year olds, for example, levels of absolute change in marriage proportions were significantly lower for the former than among the latter profile type and greater than those for the residual category (Tn->3), while relative change proportions were effectively invariate. Nor was there any significant difference between profile types in the extent of change among older females. In short, changing marriage proportions seem not to have underpinned the substantial amount of regional fertility profile restructuring in this decade, a conclusion that gains further support from the absence of significantly different estimates of the proportions of recently wed females in each profile type at the start of the period (panel 4). By a process of elimination, therefore, it seems that the dominant determinant of fertility profile change can only be the widespread, purposive postponement of childbearing over the period made possible by the increasingly general acceptance of contraception throughout a central swathe of counties stretching from Cork to Cavan and Monaghan and eastwards to include the Dublin region.

Contextual effects: If changes to the timing of reproduction within, rather than the incidence of, marriage and an increasingly widespread and effective usage of contraception do underpin profile transformation, support for this notion should be found in between-profile type differences in contextual variable means. Specifically, counties evolving from T2 to T3 might be expected to offer a greater array of meaningful alternatives to childbearing (such as employment opportunities), their females better equipped than those in T2->2 counties to take advantage of such options and possibly, too, under greater social or economic pressure to postpone and/or restrict childbearing. In fact, this would seem to have been the case for, as a group, T2->3 county units have higher mean levels of female educational attainment, labour force participation, especially outside agriculture, and involvement in professional occupations (particularly in the youngest cohort) than those retaining a T2 profile (see Table 6). Their males were also less heavily concentrated in the lowest social classes or in manufacturing and their total labour force somewhat more highly skilled, all of which would seem conducive, if not necessarily to later marriage, then at least to more effective birth control within marriage and thus, an older reproductive profile than that of the T2->2 counties.

Table 6: Contextual variable mean values in 1991 for fertility profile change categories, 1981-91

Contextual Variables - 1991	Profile change categories (z)			F
	T2->2	T2->3	Tn->3	
% females 25-34 in labour force	56.80*	59.90*	65.45 *	10.50 (c)
% females 20-24 in labour force employed off farm	55.89*	58.76†	64.61*†	8.75 (b)
% persons in labour force unskilled	12.11*†	10.06*	9.33 †	8.00 (b)
% females 20-24 in labour force occupied in professions	12.03*	13.80†	16.54*†	6.81 (b)
% male labour force in Social Classes 5 and 6	31.42*	26.72*	27.18	4.81 (a)
% male labour force in manufacturing	18.47*	16.48	12.73 *	4.17 (a)
% females with only primary/lower secondary schooling	54.60*	52.74	50.52*	3.70 (a)
% females 25-34 Irish speaking	30.08*†	34.20*	36.20†	3.54 (a)

*, † denote significantly different pairs of values, $p \leq 0.05$.

(a), (b) and (c) denote F values significant at the $0.01 < p \leq 0.05$; $0.001 < p \leq 0.01$; and $0.001 < p \leq 0.001$ levels respectively.
(z) For county unit membership of these categories see footnote to Table 5

Phase 3: familiar patterns re-established, 1991-2002

By 2002 national marriage proportions among 20-34 year old females were lower than at any stage since 1946, the incidence of divorce, *de facto* relationships and ex-nuptial childbearing higher than ever before, contraception and family planning advice freely available and labour force participation among women of childbearing age at an all time high. As a consequence, national reproduction levels were significantly lower, the TFR having remained below 2.0 for several years consecutively. Structurally, the five per cent decline in the proportion of the nation's total fertility attributable to women in their 20s was compensated for initially by gains to women in their early 30s (1991-95) and subsequently (1996-2002) at older ages. The proportion attributable to women over 30 thus rose from forty nine per cent in 1991 to nearly fifty nine per cent in 2002 - just slightly more than the fifty seven per cent obtaining in 1960 (CSO, 2004:10).

The most noteworthy feature of profile change in this period was the continued distinction between the traditional heartland of earlier marriage and childbearing in the southeast and older profiles in northern and western regions, where profiles had long been older. For example, by 1996, fifteen of the seventeen units with older T3 profiles in 1991 - all but one of them (Kilkenny) outside the southeastern/central core - had evolved T7 profiles and, by 2002, twelve of these had developed T4 profiles, the oldest type identified in this study. By contrast, none of the fourteen southeastern and central county units which, in 1991, had formed the hard core of the younger profile type T2 (with a stronger fertility peak at age 25-29 years), had evolved further than the T6 stage - *i.e.* transitional between T2 and T4 – by 1996 and, apart from Kilkenny, by 2002 none had gone all the way to a T4 profile. In short, although the national trend towards older fertility appears to have been reflected to some degree throughout the nation, a clear regional disparity was still apparent.

Determinants and correlates

Between 1991 and 2002 marriage ceased to function as a determinant of regional age-specific fertility variations among younger cohorts for, even when profile categories containing only one or two counties were excluded, differences between mean marriage proportions became either so small as to be of no statistical or interpretable significance or uncorrelated with mean fertility (Table 3). Again, therefore, explanation for fertility profile differences would seem to hang on variations in marriage timing or duration, the extent to which effective contraception is practiced and in the underlying family formation preferences. In the absence of hard data on any of these variables at the local level, however, evidence of their influence can only be inferred from the web of relationships between profile type and the contextual variables, that is, from the social ecology of childbearing revealed in these associations.

In the absence of marriage proportion effects, older profiles might be expected to characterise county units whose females, especially those in their late 20s and 30s, were best able to follow life-paths providing alternatives to or competitive with early and frequent childbearing, whether through the gaining of higher educational qualifications, the achievement of higher socio-economic status, more highly skilled and remunerated employment and/or readier access to effective family planning advice. Conversely, younger profiles might be anticipated where lower levels of female educational attainment, male and female socio-economic and occupational status, labour force participation and perhaps, too,

access to or acceptance of family planning advice, are more characteristic.

In each census year, in fact, differences across a variety of the contextual variables between some, though not all, pairs of profile types appear consistent with such expectations (Table 4). On each, for example, the older profiled western, northern and northeastern counties score more highly than the younger profiled southeast and central region on such variables as the proportions of females Irish-speaking, participating in the labour force, in professional occupations, and proportions of the labour force in Social Classes 1 and 2, but lower on levels of unemployment, unskilled labour proportions and females with lower levels of educational attainment.

The consistent linkage of such contextual variables as lower female educational attainment, higher unemployment, low workforce skills and lower social class membership with early marriage and more youthful fertility profiles comes as no surprise. In part this is because earlier completion of formal schooling, commonly underpinning lower social class membership, also tends to limit access to skilled technical and professional occupations and, in societies in which unskilled employment is decreasingly in demand, may result in higher levels of unemployment. For young women, all of these are likely to limit the range of opportunities other than childbearing and perhaps, too, to affect their knowledge of and capacity or motivation to employ effective contraception. In sum, in the framework of the cost-benefit model of fertility it can reasonably be argued that in populations with a higher incidence of such characteristics, the opportunity costs associated with earlier entry into reproduction are likely to be less onerous than those for women with higher levels of education, social class, and skilled or professional employment and thus reflected in higher age-specific fertility.

Between 1991 and 2002, therefore, the ageing of the national fertility profile displayed a strong and consistent underlying regional dimension, distinguishing essentially between a 'containing' arc of counties in which the transition from T3 through T7 to T4 was uniformly characteristic, and the remaining central and southeastern counties enclosed within this arc, where the transition remained both incomplete and more locally diverse. During this phase, differences in cohort proportions married also seem to have had little if any influence on profile structure. By contrast, the socio-economic and cultural contexts appear to have differed consistently and significantly between profile groups in ways that are suggestive of a fundamental societal cleavage between much of Horner's "more favoured" east central and southeastern settlement regions (Horner, 1993). In "more favoured regions" higher levels of childbearing at younger ages are associated with a raft of socio-economic variables suggestive of lower socio-economic standing. While in other regions fertility profiles have long been considerably older and levels of female educational attainment, labour force participation, professional occupational representation and socio-economic status are all higher.

Whether the associations between fertility and these contextual variables may be described as causal is impossible to determine from an analysis of this sort but it seems reasonable that this may well be so, for it is hardly novel to argue for a strong and inverse relationship between social class membership and the timing and level of childbearing. However while it has also been conventional to argue that such differentials tend to be mediated by age at marriage, in this day and age that relationship may no longer hold so well given the substantial weakening of the role of marriage in family formation. Whether broad

distinctions between core and periphery identify different value sets regarding family formation or merely differences in the opportunity sets available, is, of course, a matter for further research.

Conclusion

A number of criticisms may reasonably be levelled at the methodology underpinning this study. Had single year instead of five year age-specific fertility profiles been used, both the definition and membership of profile clusters would likely have been significantly different; but no such option was available. Likewise, the reduction of two hundred and fifty five county-unit profiles to only seven cluster types must inevitably have resulted in the inclusion within any cluster type of individual county-unit profiles which, if clustered on the basis of a single census year's data, may well have been differently classified. The alternative procedure, that is, clustering county-units in terms of their similarity only within each year, however, would seriously have impaired the tracking of profile change patterns over time and space which was, of course, a central objective of this study. Finally, while it is certainly the case that the use of ANOVA as the base method for attempting to distinguish between meaningful and less meaningful associations between fertility profile type and proximate determinants or contextual variables leaves something to be desired, because the results of these analyses are used essentially for descriptive rather than inferential purposes, such limitations ought not to be regarded as fundamentally flawing the results.

Such caveats notwithstanding, the results reported here show an intriguing picture of more youthful fertility profiles surging westwards across Ireland during the 1960s and '70s, progressively engulfing counties and county boroughs in every corner of the nation except the northwest before retreating again during the 1980s. A familiar dichotomy between a more youthful southeast and an older north and west is again re-established and, apparently, entrenched, since, during the last decade changes have mainly affected only the extent to which profile ageing has proceeded, without seriously damaging the strength of this divide.

While analysis has not demonstrated conclusively either the relevance of, or the weighting to be associated with individual proximate determinants or contextual variables underpinning temporal and/or spatial variations in reproductive behaviour, it does seem possible to offer a number of tentative conclusions concerning the forces responsible for the patterns of change demonstrated above. Until the middle of the 1970s, for example, the westward advance of increasingly youthful fertility profiles would seem to have resulted from, on the one hand, the gradual westward penetration of earlier marriage into regions previously characterised by a culture of older marriage and, on the other, from the equally gradual and spatially differentiated uptake of birth control by cohorts of earlier starting, older reproductively aged women desirous of limiting or halting childbearing. Because this trend was earliest most evident in Ireland's major urban centres and in counties immediately adjacent to Dublin, that is, in areas where access to family planning advice and materiel were initially and subsequently most readily available, it may well be that this represents a genuine example of the spatial diffusion of an innovation (either artificial birth control methods and/or the acceptability of the notion of controlling the timing and extent of childbearing by such means) in action. However that may be difficult, if not impossible, to ascertain empirically. What is clear, though, is that the east-west gradient of increasingly older profiles during this period parallels what seem to be meaningful differences in the extent of such urban-related attributes as higher levels of female educational attainment, occupational status and labour

force involvement, that is, in those socio-economic contextual characteristics most likely to favour the early adoption of birth control and, thus, to achieve a significant lowering of the proportion of total fertility occurring at older ages.

Throughout the 1980s, earlier marriage and the more youthful fertility profiles that had become the norm everywhere except the northwest contracted eastwards, replaced by those in which childbearing among women in their early 30s played a significantly larger part than ever before. Although this tendency to later reproduction was generally underpinned by later marriage, the change from younger to older fertility profiles could not be attributed to systematic changes in cohort marriage proportions since, even among the youngest cohort, fertility and marriage proportion means tended to be inversely rather than directly associated. While differentials in the duration of marriage within any cohort may well have been an important - though probably untestable - proximate determinant, it seems more likely that the use of effective contraception to delay births in the early years of marriage – an apparent reversal of the practices reported on by Wilson-Davis (1974) during the previous period – was more influential. Support for this conclusion can be drawn from the results of contextual variable analyses which are consistent with the notion that opportunity costs of early childbearing in such counties were likely to be higher than in others with more youthful profiles.

Post-1991, fertility profiles became increasingly older throughout the nation but the distinction between an older west and north and a younger southeast, well established by the beginning of the 1990s, remained largely intact. As was the case throughout the 1980s, neither variations in cohort marriage proportions nor in the incidence of extra-nuptial childbearing seem to have been significant determinants of profile form. This would seem to suggest that the key proximate determinant is more likely to have been differences in the use of effective birth control both for delaying the onset and limiting the extent and duration of childbearing; a conclusion consistent with the between-profile type differences in the socio-economic and cultural contexts, with later starts being more characteristic among women for whom the opportunities and opportunity costs are greatest and younger fertility where they are lower.

Notes

1 This total is comprised of the 32 Counties, County Ridings and County Boroughs or Cities for which statistical data was available in each of the census years 1961 through 2002, except for 1986, when only 31 usable units were available consequent upon the merger of Dun Laoghaire Borough into Dublin County and the non-availability of a full three-year run of birth data for the newly established County Borough/City of Galway resulting in the use of only the combined County Galway data in that year

2 County level data on the numbers of females in any age group cross-classified according to duration of marriage are not directly available from the census. At the censuses of 1971 and 1981, however, county-level data on fertility included tabulations of the numbers of "families and children born classified by duration of marriage and age group of wife at marriage", from which it is possible to approximate numbers of females in a given age group in the census year according to duration of marriage. These data may then be used to calculate a proportion of all married females in that cohort, according to marriage duration.

The approximation is arrived at by combining the experience of that portion of females aged 25-29 years who have been married for a period which, when added to their chronological age in years will place them in the age group 30-34 years at the time of the census with that of women married between the ages of 30-34 who have been wed for a period which, when added to their age at marriage, places them in the census counted cohort aged 30-34 years. For example, women married at age 30 with a marriage duration of less than 3 years, will only be 32 years of age at the time of the census; women aged 34 will only contribute to the number of married women aged 30-34 at the time of the census if they have been wed for less than one year.

Because no single year of age breakdown is available for these data it is first necessary to assume that females (= "families") in each 5-year "age of wife at marriage" cohort (e.g. 25-29 years, etc.) for each "duration of marriage" category ('<1 year'; '1 but <2 years'; '2 but <3 years') are distributed evenly across each of the five single years comprising that cohort; that is, that one fifth of all women wed for each duration of marriage category (e.g. <1 year) of any 5-year age at marriage cohort occur to each single year of that cohort.

To estimate the number of women aged 30-34 years at the census if 1971 wed for less than 3 years, we then proceed as follows:-

let the number of females in any County/County Borough for each of the duration of marriage categories "<1 yrs", "1<2 yrs" and "2<3 yrs" be represented by *a*, *b*, and *c* respectively, and let the age of wives at marriage cohorts "25-29 years" and "30-34" years be represented by *A* and *B* respectively.

The number of females aged 30-34 years in 1971 and married less than 3 years (*N*) may then be estimated from the following expression,

$$N = (0.2*Ab)+(0.4*Ac)+(1.0*Ba)+(0.8*Bb)+(0.6*Bc).$$

This number may then be expressed as a proportion of all married females aged 30-34 years enumerated at the 1971 census.

Clearly, such a measure is far from perfect. It is unlikely, for example, that the assumption concerning an even distribution of females in any duration of marriage category across each of the 5 individual years of the age at marriage cohort accurately depicts reality. In the absence of any better measure, however, it seemed reasonable to introduce numbers derived in this way into the analysis.

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